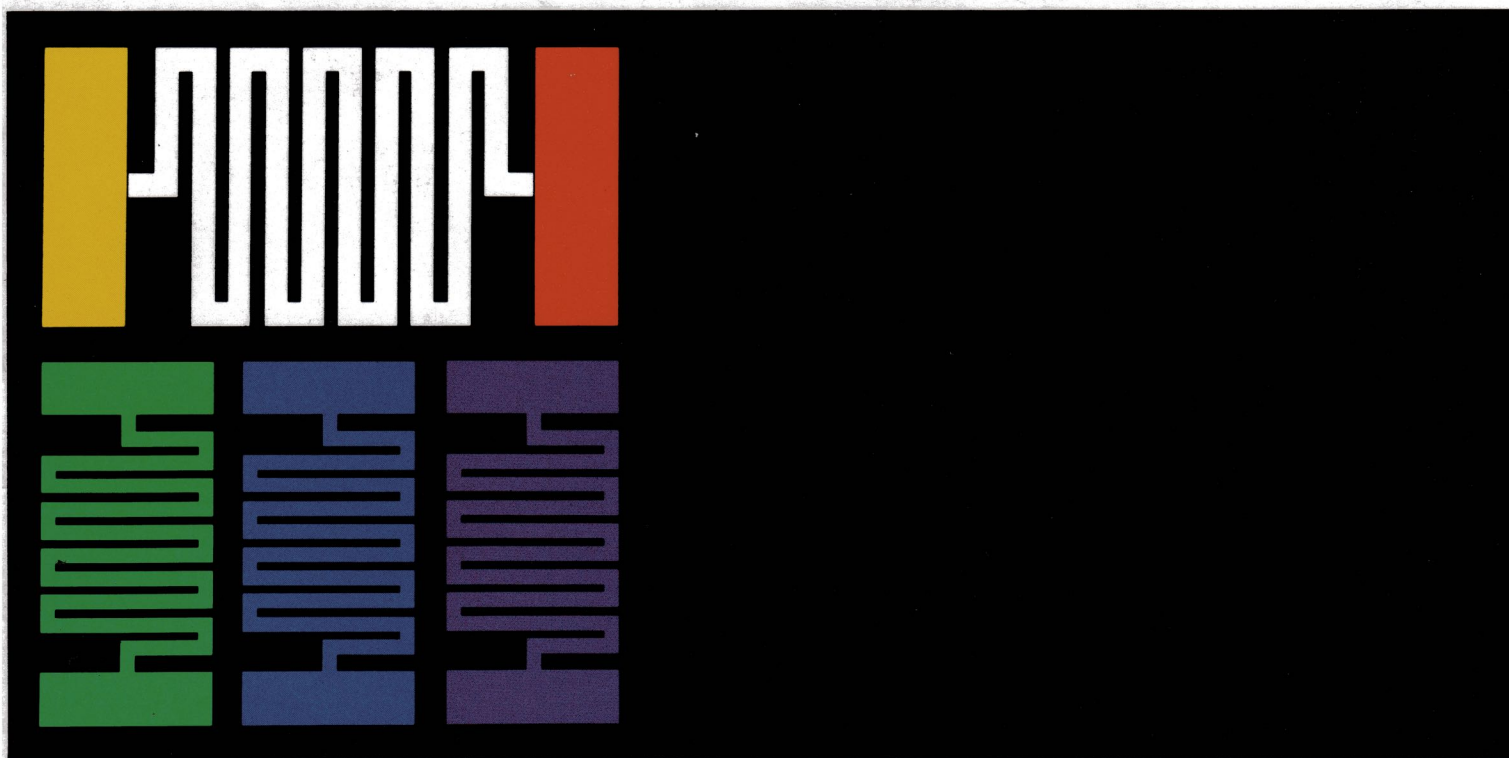

Telecom

Digital Data Service

Facilities

February 1986

Telecom – the major force in data communications



Telecom Australia

Better for Business

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DDS SERVICES

The DDS offers synchronous, full duplex, leased line services that operate at data signalling rates of 2400 bit/s, 4800 bit/s, 9600 bit/s and 48000 bit/s. The basic range of point-to-point and multipoint services is functionally similar to Datel Services. Two additional services that combine transmission and multiplexing facilities offer a number of advantages to customers prepared to restructure their operations. These major services are known as NETPLEX and NETSTREAM.

DDS service options are summarised in Table 1:

TABLE 1
DDS SERVICE OPTIONS

Data Rate (bit/s)	Interface	Point-to- Point	Multipoint	NETPLEX	NET- STREAM
2400	X21	X	X	X	
	X21 bis	X	X	X	
4800	X21	X	X	X	X
	X21 bis	X	X	X	X
9600	X21	X	X	X	X
	X21 bis	X	X	X	X
19200					X
48000	X21	X			X
	X21 bis	X			X
	X22			X	X

DDS Interfaces

The access line from the Digital Data Network (DDN) to a customer's office terminates at a Network Terminating Unit (NTU), which is provided by Telecom. The customer's data terminal equipment (DTE) interfaces the DDN at the NTU. Simple interfaces that ensure compatibility between DTEs and data communications networks have been defined and recommended by the International Telegraph and Telephone Consultative Committee (CCITT), the technical standards body for telecommunications.

Table 2 shows the CCITT interfaces that are supported by Telecom's DDS. In brackets are the plug compatible Datel Service CCITT interfaces.

TABLE 2
CUSTOMER INTERFACES SUPPORTED BY THE DDS

Data Rate (bit/s)	Interface
2400	X21 bis (V24), X21
4800	X21 bis (V24), X21
9600	X21 bis (V24), X21
48000	X21 bis (V35), X21, X22

The interface between a DTE and NTU in public data networks is defined by CCITT Recommendation X21, but recognising that most

customers currently have terminals with data modem-compatible interfaces, Telecom also supports CCITT Recommendation X21 bis (V24 and V35). This means that some DDS Services are plug-compatible with Datel Services and in these cases it is not necessary for customers to change their existing operations to take advantage of superior DDS facilities.

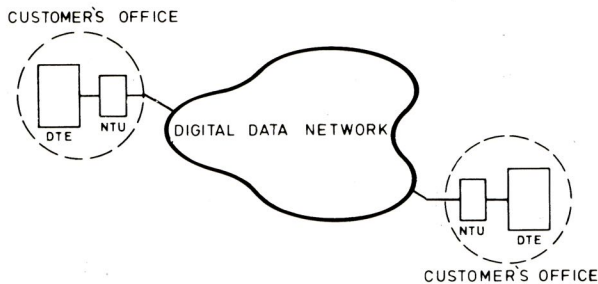
CCITT Recommendation X21 bis defines an interface between a DTE and an NTU for connection on public data networks of synchronous DTEs which interface to V-series data modems. X21 bis is an interface that is compatible with the current V-series data modem interfaces (shown in brackets in Table 2). This interface is the most common at present because many customers have terminals with data modem compatible interfaces.

CCITT Recommendation X21 defines an interface between a DTE and an NTU for synchronous operation on public data networks. X21 is a new generation interface that has been specifically defined for public data networks.

CCITT Recommendation X22 defines an interface between a DTE and a NTU, operating at 48000 bit/s and receiving multiplexed synchronous data streams from a number of X21 or X21 bis DTE's.

Customers using X21 and X22 interfaces are able to install DTEs several hundred metres from their NTUs. This contrasts with the X21 bis interface which places a 15 metre limit on the length of the interface cable between the data modem and DTE.

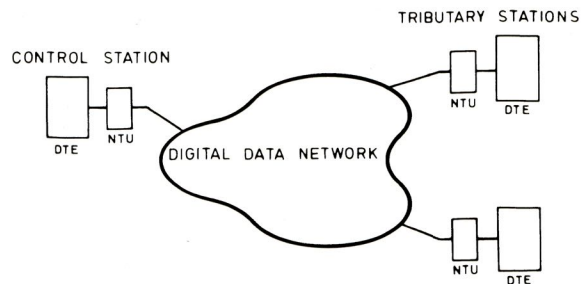
DDS Point-to-Point Service



A DDS point-to-point service provides a dedicated, synchronous leased line between two DTEs (including items such as computers, multiplexers, high speed teleprinters and visual display units). Telecom provides NTUs to interface the DTEs.

A point-to-point service can support DTEs operating in either full or half duplex. The available range of speeds is 2400 bit/s, 4800 bit/s, 9600 bit/s and 48000 bit/s.

DDS Multipoint Service

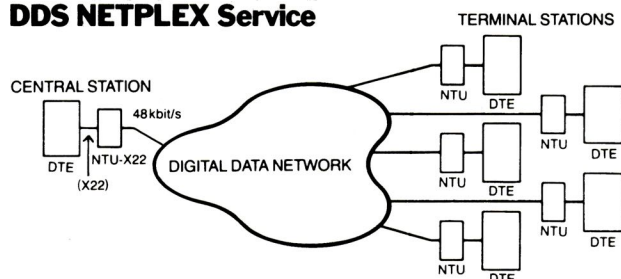


A DDS multipoint service enables three or more stations to be connected on a single line. One DTE (e.g. a computer) is designated the control station and the others (e.g. VDU terminals) tributary stations.

The mode of operation of a multipoint service may be described as "interface controlled multipoint" (similar operation to Datel "controlled carrier multipoint").

The maximum number of NTUs that may be connected on a single multipoint line is determined by operational considerations only.

DDS NETPLEX Service



A DDS NETPLEX service multiplexes data from a number of different terminal stations into a single multiplex stream that can be accepted directly by a central station. An exclusive, dedicated communications path is provided between each terminal station and the central station.

Telecom supplies a special NTU that provides timing to allow demultiplexing by a customer's front end equipment. Data crosses the DTE/NTE interface at the central station in a 48 kbit/s time division multiplex stream. A multiplex time slot is provided for each terminal station and the format of the multiplex stream is defined by CCITT Recommendation X22.

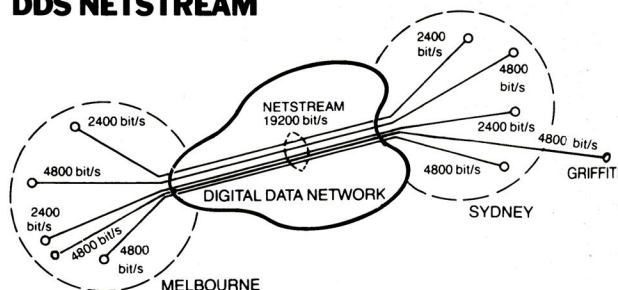
At present the X22 interface is able to accommodate the following combinations of data circuits up to a **maximum** aggregate data rate of 48 kbit/s:

- 20x2400 bit/s
- 10x4800 bit/s
- 5x9600 bit/s

NETPLEX combines transmission and multiplexing functions to provide cost and control advantages to customers prepared to adopt the service. Networks based on NETPLEX can be readily re-configured by manual patching to handle planned or unplanned network re-arrangements. This makes the service particularly valuable to any customer whose business viability might be threatened by any prolonged failure of his computer or communications facilities.

As well as the NTU-X22 Telecom supplies special Test Access Equipment (TAE/X22) which is inserted between the DTE and the NTU to provide a range of test facilities for the NETPLEX Service. The TAE allows the customer to monitor the status of an individual channel within the NETPLEX stream or to divert a selected channel through the TAE to a local terminal or local test equipment. A facility is also provided on the TAE which permits remote activation of loops on the NTUs on terminal stations of the NETPLEX network. This allows data testing of NETPLEX point-to-point links.

DDS NETSTREAM



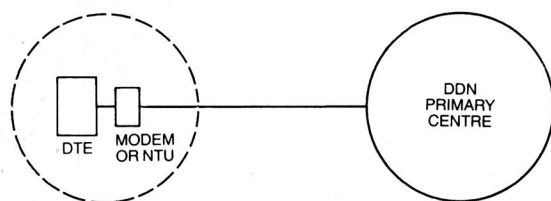
NETSTREAM is a pricing feature that assists customers to configure their networks to achieve maximum efficiency and cost savings.

DDS NETSTREAM nominally aggregates separate data services into a higher speed data stream of 4800, 9600, 19200 and 48000 bit/s for charging purposes and applies to customers who have two or more services occupying the same chargeable transmission route (see page 11). Although the customer will effectively have a number of separate data services, a **transmission charge only** for the **aggregate** data stream is charged. NETSTREAM can be used to aggregate combinations of services that operate in point-to-point, multipoint or NETPLEX modes. Substantial saving benefits are available through this pricing feature. To be eligible for NETSTREAM, a customer must apply for all relevant services in one State and in turn be billed by that State.

The above example portrays 5 terminals in Melbourne communicating on dedicated lines with 4 terminals in Sydney and one in Griffith (NSW). With NETSTREAM, a customer pays a transmission charge for the aggregate 19200 bit/s data stream on the Melbourne to Sydney route, instead of paying separately for each point-to-point service. A worked example using NETSTREAM charges is contained in the DDS Pricing brochure.

OUT OF AREA ACCESS

CUSTOMER'S PREMISES



In certain situations, Telecom may provide access to the Digital Data Network for customers located outside the defined boundaries of the Primary, Secondary or Tertiary Centres (see page 10).

Out of Area Access may be via either a standard NTU or a Datel modem, depending on network considerations.

For charging purposes, Out of Area Access connects a customer's DTE directly to the Primary Centre.

Further details may be obtained from State Data Offices, which are listed on page 12.

Fault Reporting and Testing

The DDN provides centralised test facilities to enable a customer's service to be checked and tested, quickly and efficiently. These test facilities are located at the Special Service Restoration Centre (SSRC)-1107 which is the focal point for all DDS service difficulties and fault reporting. In N.S.W., the telephone number is 211 0711.

In addition, customers have the facility of being able to test the integrity of their DTE and their DDS service using several test facilities on the NTU. Both local and remote loopback facilities are provided.

Service Objectives

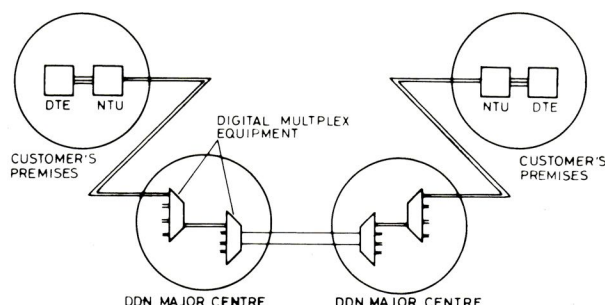
A comprehensive network management system, well protected digital links and high equipment reliability are features of the DDS. The network has been designed to achieve fast provision and restoration of services. Telecom has designed the Digital Data Network to meet the following performance objectives:

- A DDS long term target availability of 99.9%, with a low probability of an outage exceeding 4 hours in duration.
- A long term error performance of 99.5% error free seconds.
- A propagation delay through the network less than 20 ms for a typical service. However, the propagation delay will depend on the data rate of the service. The higher the data rate, the lower the delay.

DDS NETWORK STRUCTURE

The basic structure of the Digital Data Network (DDN) is shown in Figure 1.

FIGURE 1—DDN BASIC STRUCTURE



The DDN has been developed and established within a two level network hierarchy. These are the basic building blocks of the network.

- Major centres act as collection points for the Digital Data Network in their zones. They also contain network synchronisation and network management systems.
- Other smaller centres are focal points for multiplexing and transmission of customer data services. They are located in telephone exchanges in accordance with demand requirements in particular areas. All traffic between smaller centres traverses the parent major centre.

DDN major centres have been initially interconnected over long distances by 2048kbit/s digital links on analogue radio bearers, until preferred digital radio bearers become available in 1985/86. The transmission links in the metropolitan area are being provided using 2048kbit/s digital line transmission systems developed for Pulse Code Modulation (PCM) telephony use.

Network Terminating Units

An advantage of the DDS is that the network allows digital data to be transmitted directly from a customer's office to the network via an NTU. This is a much simpler device than a data modem.

An NTU performs several functions:

- It transforms the original information stream from a DTE into a format acceptable for the network.
- It uses direct digital transmission over the physical line between a customer and the network. This means that there is no need to convert the digital output from a DTE into analogue form for transmission over the public switched telephone network.
- It extracts timing from the line signal and provides timing to its DTE.
- It incorporates facilities that allow a customer to check local operation and the integrity of the total communication path.
- It responds to Network Management Centre commands for data looping.

Telecom markets a wide range of data modems to Datel customers. The full range of DDS services can be provided with a much smaller number of NTUs.

DDS EXPANSION

The DDS is being expanded in stages. Currently, the service caters for data services between all capital cities and Canberra, and is rapidly expanding into other cities and country towns. By June 1985, DDS service will be available in over 100 cities and towns throughout Australia.

The timing and location of this expansion will be announced progressively and intending customers should check the timing with the State Data Offices.

DDS CHARGES

The DDS provides end-to-end service from customer interface to customer interface with prices based on the following general principles:

- The charging structure is simple, so that it can be easily understood by customers.
- Charges are designed to be attractive to operators of large teleprocessing leased networks. Most customers will find that DDS charges for long haul services will be substantially lower than Datel charges.
- The pricing structure is designed to enable customers to design their networks more flexibly.
- Charges increase with the data rate and are less distance dependent than Datel charges.

DDS CHARGING ZONES

Australia has been divided into 9 zones for charging purposes (see Figure 2). Zone boundaries coincide with State boundaries, except for Western Australia and Queensland, which have both been divided into northern and southern zones.

For charging purposes in:

(i) Queensland

The zone boundary between the northern and southern zones coincides with the northern boundary of the Mackay, Emerald, Longreach and Charleville telephone charging districts.

(ii) Western Australia

The zone boundary between the northern and southern zones coincides with the northern boundary of the Carnarvon, Meekatharra and Kalgoorlie telephone charging districts.

Within each State there may be three types of centre, primary, secondary and tertiary.

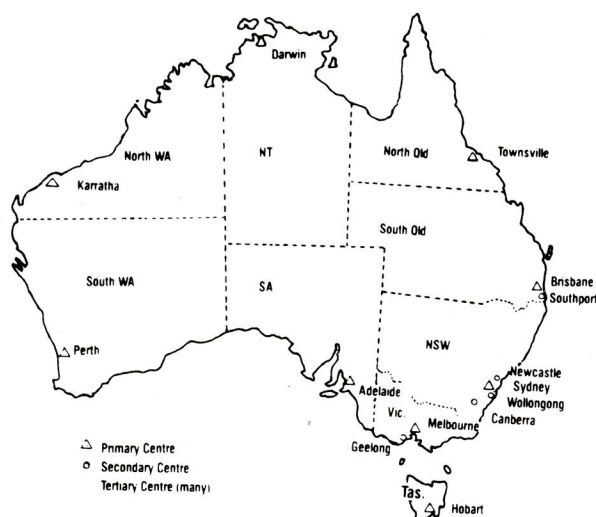
- The **primary DDS centre** is the principal city in each zone, e.g. Sydney, Melbourne, Brisbane. The boundaries of a primary centre generally coincide with the boundaries of the telephone charging district. However in the case of the Karratha and Townsville Primary Centres, the boundaries are in accordance with the area serviced by the respective telephone exchanges. The boundary of the Darwin Primary Centre is in accordance with the areas serviced by the Darwin and Berrimah Telephone Exchanges.

Within the boundaries of each primary centre a number of smaller centres may be located to provide geographical coverage of DDS to all areas of the primary centre. No transmission charges are applicable to services connected via a smaller centre to the major centre in that zone.

- **Secondary DDS centres** are smaller centres within a zone, e.g. Canberra, Newcastle, Geelong. Some zones do not have any secondary centres. The boundaries of a secondary centre coincide with the boundaries of the local telephone zone. Within the boundaries of each secondary centre a number of smaller centres may be located to provide geographical coverage of DDS to all areas of the secondary centre. No transmission charges are applicable to services connected via a smaller centre to the local secondary centre in that zone.
- **Tertiary DDS centres** are provincial and regional centres, e.g. Dubbo, Taree, Morwell. The boundaries of a tertiary centre coincide with the area serviced by the DDS exchange.

Customers in some centres located on zone borders, or having a community of interest with a Primary Centre in another zone, may elect to belong to either zone for charging purposes, e.g. Albury/Wodonga, Coolangatta/Tweed Heads, Alice Springs.

FIGURE 2—DDS CHARGING ZONES



DDS CHARGES

Although customers' total charges will depend on their overall network configurations, the pricing elements making up the totals are designed to facilitate calculation of charges. The three basic pricing elements used to construct DDS charges are:

- An **installation charge** for each NTU required to support a service.
- An annual **access charge** for each NTU required to support a service.
- An annual **transmission charge** for the data transmission capacity used by a customer on each chargeable route.

The chargeable transmission routes are:

- between two primary centres
- between a secondary centre and a primary centre in another zone
- between a secondary centre and its zone primary centre
- between a tertiary centre and its zone primary centre.

The DDS Pricing brochure contains worked charging examples for particular network configurations and services.

OTHER RELEVANT TELECOM REFERENCES

Digital Data Service Price List Issue Nov. 85.

Digital Data Service Vitalink General Information Issue Dec. 85.

Digital Data Service Austplex General Information Issue Dec. 85.

Digital Data Service Enhanced Facilities.

LODGE^{MENT} OF APPLICATIONS AND FURTHER INFORMATION

Further information may be obtained by contacting any of the following State Data Offices. DDS applications may also be lodged at these locations:

N.S.W.	Business Sales Section, Commercial Department, 1st Floor, Telecom House, 233 Castlereagh Street, SYDNEY N.S.W. 2000. Telephone: (02) 267 6767.	W.A.	Telegraph and Data Branch, Operations Department, 4th Floor, Telecom Centre, 80 Stirling Street, PERTH W.A. 6000. Telephone: (09) 420 7200.
VIC.	Business Sales Section, Commercial Department, 8th Floor, 484 St. Kilda Road, MELBOURNE VIC. 3004 Telephone: (03) 11510.	TAS.	Telegraphs and Data Branch, Operations Department, 2nd Floor, Knopwood House, 38 Mont Pelier Retreat, BATTERY POINT TAS. 7000. Telephone: (002) 20 8800.
QLD.	Telegraphs and Data Branch, Operations Department, 5th Floor, Societe Generale House, Cnr. Creek and Elizabeth Sts., BRISBANE QLD. 4000. Telephone: (07) 835 6400.	A.C.T.	Telegraphs and Data Section, Operations Department, 2nd Floor, MLC Building, London Circuit, CANBERRA CITY A.C.T. 2601. Telephone: (062) 45 5555.
S.A.	Telegraphs and Data Branch, Operations Department, 5th Floor, BP House, 30 Flinders Street, ADELAIDE S.A. 5000. Telephone: (08) 217 9367.	N.T.	District Telecommunications Branch, Operations Department, 3rd Floor, Hooker Building, 47 Mitchell Street, DARWIN N.T. 5790. Telephone: (089) 89 3266.



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